1.21 ICE MICROPHYSICS DURING OLYMPEX: COMPARISON BETWEEN REMOTE SENSING AND AIRBORNE IN SITU OBSERVATIONS

F. TRIDON[1], A. BATTAGLIA[12], R. CHASE[3], K. MROZ[2], J. TURK[4], S. TANELLI[4], S. NESBITT[3], J. LEINONEN[4], S. KNEIFEL[5]

[1]Department of Physics and Astronomy, University of Leicester, UK [2]National Center Earth Observation, University of Leicester, Leicester, UK

[3]Department of Atmospheric Sciences, University of Illinois at UrbanaChampaign, Urbana, Illinois

[4]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA

[5]Institute for Geophysics and Meteorology, University of Cologne, Cologne, Germany

ft57@le.ac.uk

While the majority of rainfall is generated via the ice phase over the mid-latitude, the microphysical characterisation of ice is still a challenge. Large uncertainties arise from the difficulty in directly measuring various critical microphysical parameters associated with ice particles, such as particle size distribution (PSD), particle mass-size and fall speedsize relationships, and particle habit and orientation. Riming strongly alters these properties and is known to be correlated with snow accumulation in mountainous areas.

Several recent studies have shown the ability of a triple-frequency radar combination to distinguish between rimed and fluffy aggregates. Such triple-frequency signatures can be reproduced by scattering models (e.g. Discrete Dipole Approximation or Rayleigh-Gans approximation) which take into account the non-homogeneous internal structure of snowflakes. Using one of these state-of-the-art scattering models, triple-frequency radar observations can be optimally matched for retrieving quantitative properties of ice (such as the mean mass diameter, D_m, and Ice Water Content, IWC), yet large uncertainties remain in the scattering properties.

The Olympic Mountains Experiment (OLYMPEX) which took place in Washington State (USA) during the winter 2015-2016 provides an unprecedented dataset for narrowing down this challenge, with coordinated flight transects of triple frequency radar and in situ measurements. Firstly, images of ice particles are used to qualitatively confirm the type of ice retrieved by the radar retrieval. Secondly, consistency between triple frequency signatures and ice properties derived from total mass and PSD in situ measurements is investigated. Finally, radar retrieved and in situ derived Dm and IWC are compared.